Riveting Procedures and Specifications for Blind Rivets

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ABSTRACT: Outlines riveting criteria and procedures to be used by design engineering, manufacturing, and quality.

APPLICABILITY: This document applies to all Engineering personnel involved in mechanical design and is a guideline for manufacturing, quality, and assembly.

STATUS: APPROVED 28-Feb-1991; use VTX SMC for current status.

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1 INTRODUCTION

Changes in mechanical assembly dimensioning have caused a major change in manufacturing riveting processes. The original Digital specification on riveting was structured around a single manufacturer. Since that time, new developments have been made in the areas of riveting and rivet tooling, which have necessitated the creation of this new document.

This specification is intended to cover all facets of riveting: dimensional characteristics, inspection, tool selection, troubleshooting, and rivet removal. It also covers structural, nonstructural, monobolts, repetition, and special rivets.

2 SELECTING THE CORRECT RIVET

There are eight areas to consider when selecting the correct rivet. These are tensile strength, grip range, the assembly process, base material, shear strength, rivet head style, cost, and mechanical design. This document provides information on each of these areas.

3 TYPES OF RIVETS

Using the Industrial Fasteners Institute (IFI) documents as references, the following types of rivets are available. Refer to Table 2.

IFI 114 Commercial Type Break Mandrel Rivet - These rivets are nonstructural, with the mandrel breaking below the shear plane. They are widely available, cost-effective, and good for tacking light loads. The primary vendors are Cherry Commercial Fasteners and USM.

IFI 117 Nonstructural Pull-Through Mandrel Blind Rivet - This is a hollow rivet. During the setting process, the mandrel is pulled through the body of the rivet. This is semiautomated feed because up to 50 rivets may be loaded into the setting tool. This is very cost-effective per rivet. The primary vendor is Avdel, Incorporated.

IFI 119 Structural Flush Break Mandrel Self Plugging Blind Rivet - During the setting operation the mandrel is pulled into and against the rivet head. A flush break means that the mandrel will break at a point within or above the rivet head, which is determined by the material thickness. Cherry Commercial Fasteners, USM, and Automated Fasteners are the primary vendors.

IFI 123 Drive Pin Rivet - This is a blind rivet with the drive pin set into the head of the rivet body. This type of rivet is set by using a hammer. Driving the pin into the rivet will cause the end of the rivet to flare. These rivets are available from Avdel, Incorporated, Cherry Commercial Fasteners, and Southco.

IFI 126 Closed-End Rivet - This rivet is similar to IFI 119 rivets in performance, but has the added advantage of being a closed-end rivet. It is used when watertight applications are required or when it is absolutely necessary that the mandrel be captive. The primary vendors are Cherry Commercial Fasteners and USM.

IFI 134 Monobolt Rivet - This rivet has a higher tensile than IFI 119, and a similar shear. Its grip range is greater because the mandrel is pulled through the rivet body and sets against the tool nosepiece. This situation always results in a flush break but gives no indication of rivet performance. Avdel, Incorporated and Cherry Commercial Fasteners are the primary vendors.

Table 1: Comparative Costs for Rivets and Tools

IFI Standard Number and Name	Rivet	Tool
114 Commercial	Low cost Low strength High assembly time	Low cost Single setting tool
117 Pull-through Semiautomatic	Lowest cost Moderate strength Lowest assembly time	Moderate cost Semiautomatic
119 Structural	Moderate cost High strength High assembly time	Low cost Single setting tool
123 Drive Pin	Moderate cost Moderate strength	No special setting required. Use a hammer.
126 Closed-End	High cost Moderate-High strength High assembly time	Low cost Single setting tool
134 Monobolt	Highest cost Highest strength	Moderate cost Single setting tool

Table 2: Rivet Grade Designation

Rivet Grade	Rivet Body Material	Mandrel Material	IFI Specification Number						
			114	134	117	119	123	126	130
10	Alum Alloy 5050	Alum Alloy 7178 -2024	114						
11	Alum Alloy 5052	Alum Alloy 7178 -2024	114			119			
12	Alum Alloy 5056	Alum Alloy 7178 -2024		134		119	123		130
13	Alum Alloy 5056	Alum Alloy 2027					123		
14	Alum Alloy 2117	Alum Alloy 2017		134					
15	Alum Alloy 1100	Alum Alloy 7178 -2024						126	
16	Alum Alloy 5154	Carbon Steel	114						
17	Alum Alloy 2117	Carbon Steel			117				
18	Alum Alloy 5052	Carbon Steel	114		117				
19	Alum Alloy 5056	Carbon Steel	114		117	119		126	130
20	Copper Alloy 110	Carbon Steel	114					126	
25	Alum Alloy 2017	Carbon Steel			117				

Table 2 (Cont.): Rivet Grade Designation

Rivet Grade	Rivet Body Material	Mandrel Material	IFI Specification Number						
			114	134	117	119	123	126	130
26	Alum Alloy 5052	Stainless Steel 400 Series	114						
30	Low Carbon Steel	Carbon Steel	114	134	117	119	123		
31	Low Carbon Steel	Stainless Steel 300 Series		134			123		
40	Nickel Copper Alloy Monel	Carbon Steel	114		117	119			
42	Nickel Copper Alloy Monel	Stainless Steel Steel				119			
50	Stainless Steel 300 Series	Carbon Steel	114			119			
51	Stainless Steel 300 Series	Stainless Steel 300 or A286	114	134		119			
52	Stainless Steel 300 Series	Stainless Steel 400 Series				119			
60	Alum Alloy 2117	Stainless Steel 300 Series					123		
61	Alum Alloy	Stainless Steel 300 Series					123		

4 NATURE OF MATERIALS

Whenever possible, try to match the rivet material to that of the members to be fastened. This will help to prevent joint failure due to shear breaks. Equally important, it will help to avoid weakening due to galvanic corrosion, which can occur whenever two dissimilar materials come in contact in the presence of an electrolyte. When materials cannot be matched, the possibility of corrosion can be minimized by reducing the contact area, using plated or painted rivets, and selecting a grade that is as similar to the members as possible on the galvanic scale. See Table 3 for a galvanic table of materials.

When considering wave solder applications, any mechanical assembly that may come in contact with a wave soldering process (such as brackets, handles, or PC Boards) must not contain any contaminating alloys such as aluminum or pure copper.

Table 3: Galvanic Series in Sea Water

Corroded end (anodic)	Lead
	Tin
Magnesium	
Magnesium alloys	Muntz metal
	Manganese bronze
Zinc	Naval brass
Galvanized steel	
Galvanized wrought iron	Nickel (active)
	Inconel (active)
Aluminum:	
52SH, 4S, 3S, 2S, 53ST	
Aluminum clad	Yellow brass
	Admiralty brass
	Aluminum bronze
Cadium	Red brass
	Copper
Aluminum:	Silicon bronze
A17ST, 17ST, 24ST	Ambrac
	70-30 copper-nickel
Mild steel	Comp. G, bronze
Wrought iron	Comp. M, bronze
Cast iron	
	Nickel (passive)
	Iconel (passive)
Ni-resist	
13% chromium stainless steel	
type 410 (active)	Monel
50-50 lead-tin solder	18-8 stainless steel
	type 304 (passive)
18-8 stainless steel	18-8-3 stainless steel
type 304 (active)	type 316 (passive)
18-8-3 stainless steel	
type 316 (active)	Protected end (cathodic or most noble)

5 DETERMINING THE RIVET GRADE

Rivet grade is a method developed by the IFI to categorize the various types of rivets by the materials used in rivet manufacturing. Table 2 shows the grade designations for available rivets. This grade designation will be referenced in other tables in this specification, which give tensile and shear values.

6 SHEAR AND TENSILE STRENGTHS

Shear and tensile strengths have been determined for rivets with sizes used in Tables 4 through 8. If larger holes are required to accommodate tolerancing problems, refer to Tables 9 and 10.

Table 4: Shear and Tensile Strength, in Pounds - Rivet Diameter 3/32 inch

	IFI Specification 114	
Rivet Grade	Shear	Tensile
10	70	80
11	70	80
16	90	120
18	70	80
19	90	120
30	130	170
40	200	250
50	230	280
51	230	280

Table 5: Shear and Tensile Strength, in Pounds - Rivet Diameter 1/8 inch

	IFI Specification							
Rivet	114		117		119		126	
Grade	SHR	TEN	SHR	TEN	SHR	TEN	SHR	TEN
10	120	150						
11	120	150			220	180		
12					230	180		
13								
14								
15							100	110
16	170	220						
17			140	220				
18	120	150	130	210				
19	170	220	120	180	340	275	240	280
20							220	300
25			250	380				
26	155	210						
30	260	310	200	300	450	350		
40	350	450	250	400	525	450		
42					475	400		
50	420	530			550	530		
51	420	530			550	530		
52					550	530		

Table 6: Shear and Tensile Strength, in Pounds - Rivet Diameter 5/32 inch

	IFI Specification									
Rivet	114		117		119		123		126	
Grade	SHR	TEN	SHR	TEN	SHR	TEN	SHR	TEN	SHR	TEN
10	190	230								
11	190	230								
12							NA	NA		
13					340	300				
14							NA	NA		
15									130	160
16	260	350								
17			220	350						
18	190	230	210	340						
19	260	340								
20									NA	NA
25			470	720						
26	260	340								
30	370	470	340	510	525	500	NA	NA		
31							NA	NA		
40	550	700	400	650	700	700				
41										
42					630	630				
50	650	820			850	850				
52					850	850				
60							NA	NA		
61							NA	NA		

NA = Not Available

Table 7: Shear and Tensile Strength, in Pounds - Rivet Diameter 3/16 inch

	IFI Specification											
Rivet	114		117		119		123		126		134	
Grade	SHR	TEN	SHR	TEN	SHR	TEN	SHR	TEN	SHR	TEN	SHR	TEN
10	260	320										
11	260	320										
12					480	400					550	450
13							NA	NA				
14							NA	NA			550	450
15									210	250		
16	380	500										
17			330	530								
18	260	320	310	500								
19	380	500	270	420	654	600			500	690	*900	
											*1350	600
20									NA	NA		
25			580	900								
26	300	465									1300	1000
30	540	680	500	670	900	700	NA	NA			1300	1000
31							NA	NA				
40	800	1000	620	1050	1200	1000						
41												
42					1080	900						
50	950	1200			1325	1200						
51											1300	1000
52					1325	1200						
60							NA	NA				

* Information derived from vendor specifications, not included in IFI 134
NA = Not Available

Table 8: Shear and Tensile Strength, in Pounds - Rivet Diameter 1/4 inch

	IFI Specification											
Rivet	114		117		119		123		126		134	
Grade	SHR	TEN	SHR	TEN	SHR	TEN	SHR	TEN	SHR	TEN	SHR	TEN
10	460	560										
11	460	560			900	650						
12					900	650					1270	850
14							NA	NA			1270	850
17			600	960								
18	460	560	NA	NA								
19	700	920	490	780	1200	1000			900	1000	*1500	900
											2100	1100
25			NA	NA							2400	215O
30			900	1300	1750	1400	NA	NA			2400	2150
31							NA	NA				
40			1150	1900	2000	2000						
42					1800	1800						
50					2250	2100						
51					2250	2100					2400	2150
52					2250	2100						
60							NA	NA				
61							NA	NA				

*Information derived from vendor specifications, not included in IFI 134.
NA = Not Available

7 DESIGN CONSIDERATIONS

The effectiveness of any fastener depends on how well it is applied. Careful design will provide effective fastening. Some of the variables to consider are the hole types, hole sizes, tensile strength of rivet, grip range, joint type, configuration, material to be riveted, tool access and clearance, and rivet size and spacing.

7.1 RECOMMENDED GRIP RANGES

Grip ranges vary widely among various types of rivets and vendors. For specific dimensions, refer to the appropriate purchase specification or vendor specification. For example:

90-09595-0-0 1/4 INCH RIVET
RECOMMENDED HOLE SIZE 0.257 - 0.261 inch
MATERIAL GRIP RANGE 0.125 - 0.250 inch

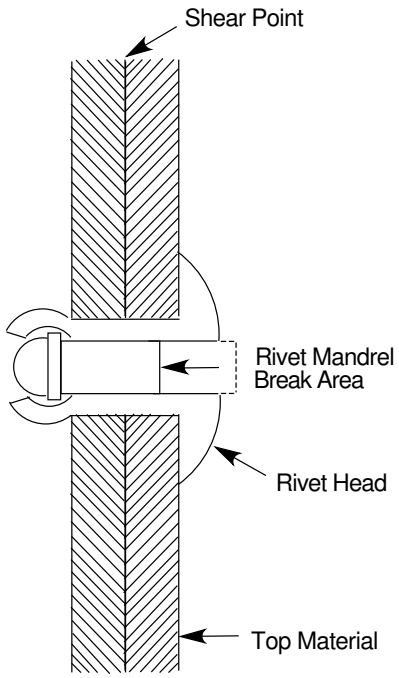
NOTE

Any deviation from the recommended hole sizes will affect the shear-mandrel break point, or tensile strength.

7.2 MANDREL BREAK AREA

A mandrel break is correct if the mandrel is no more than 0.060 inch above the rivet head or is recessed a maximum of 25% of the top material's thickness. See Figure 1.

Figure 1: Correct Mandrel Break Area



A mandrel break is incorrect if the mandrel is more than 0.060 inch above the head or is recessed more than 25% of the top material's thickness. See Figure 2.

Excessive depth or excessive protrusion may be the result of one or more of the following problems.

a. The hole size is too large.

b. The hole size is too small.

c. The grip range rivet is incorrect for material.

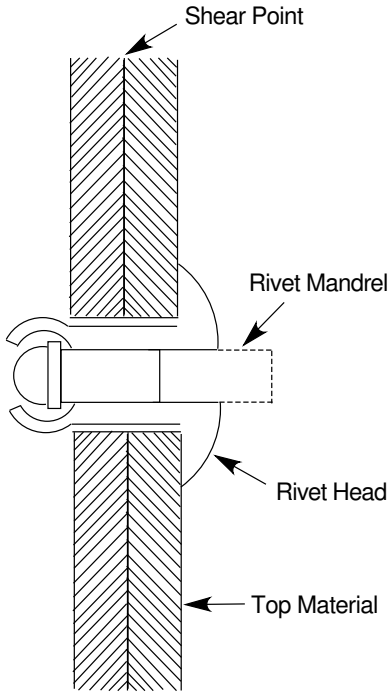
d. The pulling head or nosepiece is incorrect.

e. The air pressure is low.

f. The hydraulic oil is low.

g. The hoses are damaged.

Figure 2: Incorrect Mandrel Break Points



7.3 ASSEMBLY HOLE SIZES AND TOLERANCES

7.3.1 Hole Alignment

The hole size in the bottom material should be enlarged to allow for tolerance buildup. The grip range must be calculated to allow for recession of the rivet bulb into the bottom material. See Figure 3.

Figure 3: Rivet-to-Hole Alignment - Recommended

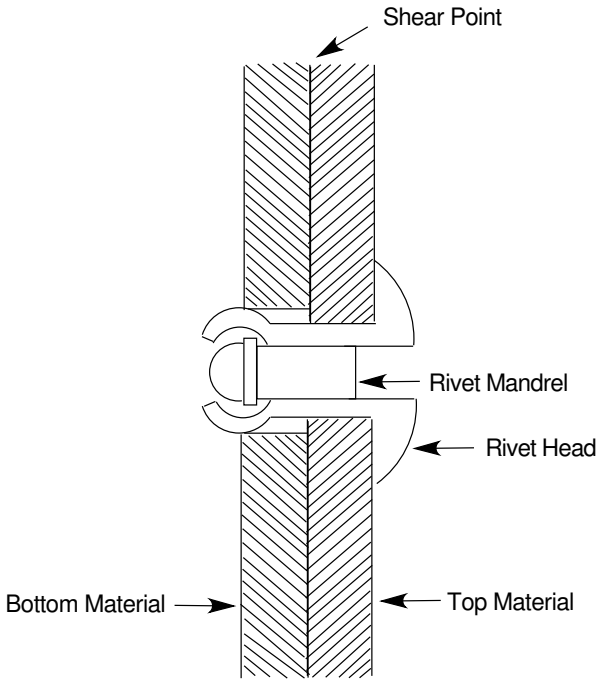
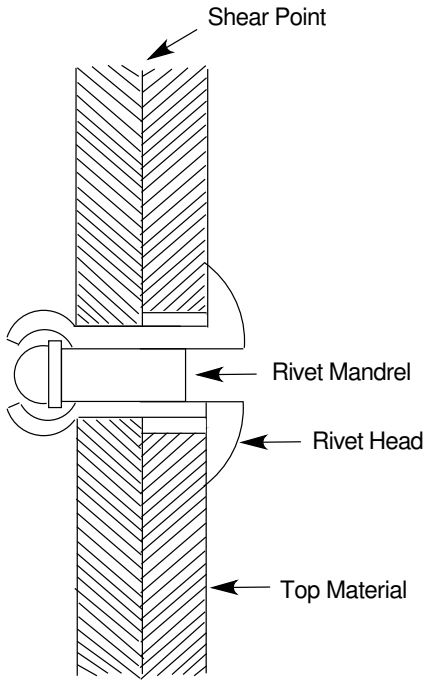


Figure 4 shows a hole alignment that is not recommended. The material is allowed to move before the rivet shear is encountered.

Figure 4: Rivet-to-Hole Alignment - Not Recommended



7.3.2 Recommended Hole Sizes

Use the vendor's recommended hole size whenever possible. If tolerance buildup is a problem, the hole sizes in Tables 9 and 10 may be used. Caution should be taken with this arrangement as excessive hole size may result in poor mandrel retention or reduced clamp-up. This situation can usually be corrected by changing the rivet to a shorter grip range rivet. Undersize holes will cause split rivets, installation problems, and improperly set rivets.

Table 9: Recommended Hole Sizes

Rivet No.	Nominal Rivet Diameter (Inch)	IFI Type	Manufacturer's Recommended Hole Size	Acceptable Hole Sizes			
				Top Material		Bottom Material	
				MIN	MAX	MIN	MAX
3	3/32 .0938	114	0.097 - 0.100	0.097	0.100	0.100	0.105
4	1/8 .1250	114-117 119-126	0.129 - 0.133	0.129	0.132	0.133	0.137
5	5/32 .1562	114-117 119-126	0.160 - 0.164	0.160	0.163	0.164	0.168
6	3/16 .1875	114-117 119-126-130	0.192 - 0.196	0.192	0.196	0.196	0.202
		134	0.194 - 0.204	0.194	0.202	0.202	0.208
8	1/4 .250 .257	114-117 119-126-130	0.257 - 0.261	0.257	0.262	0.262	0.270
		134	0.261 - 0.276	0.261	0.274	0.274	0.282

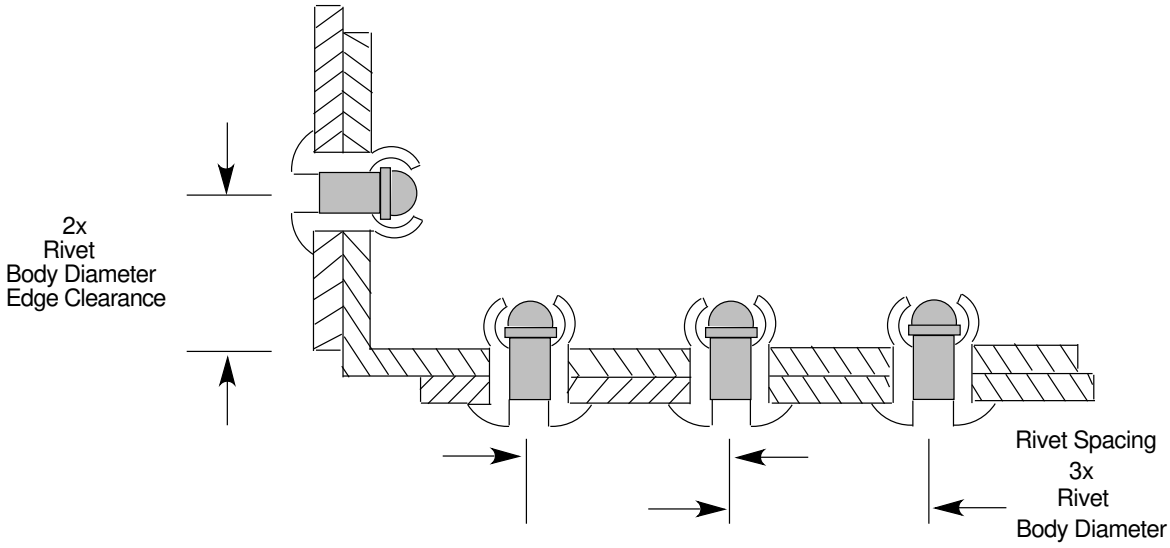
Table 10: Recommended Hole Sizes - Three Material Thicknesses

Rivet No.	Nominal Rivet Diameter (Inch)	IFI Specification	Manufacturer's Recommended Hole Size (Inch)	Acceptable Hole Sizes (Inch)					
				Top		Center		Bottom	
				MIN	MAX	MIN	MAX	MIN	MAX
3	3/32 0.0938	114	0.097 - 0.100	0.097	0.100	0.098	0.102	0.101	0.104
4	1/8 0.1250	114-117 119-126	0.129 - 0.133	0.128	0.132	0.131	0.134	0.133	0.137
5	5/32	114-117 119-126-130	0.061 - 0.164	0.160	0.163	0.162	0.165	0.164	0.178
6	3/16 0.1875 0.189	114-117 119-126 134	0.192 - 0.196 0.194 - 0.204	0.192 0.194	0.195 0.199	0.194 0.198	0.197 0.204	0.196 0.203	0.202 0.208
8	1/4 0.250 0.257	114-117 119-126 130 134	 0.257 - 0.261 0.261 - 0.276	 0.256 0.261	 0.260 0.270	 0.259 0.270	 0.263 0.278	 0.263 0.278	 0.270 0.283

8 SPACING REQUIREMENTS AND EDGE CLEARANCE

For maximum joint strength, the distance from the rivet center line to the edge of the sheet should not be less than twice the rivet body diameter. For spacing, regardless of the type of joint, the distance between rivet centers should be three times the rivet body diameter. This will reduce the incidence of rivet failure. This three-times diameter factor can be increased or decreased depending on joint loading and the type of rivet used. Testing should be conducted before the design is complete. See Figure 5.

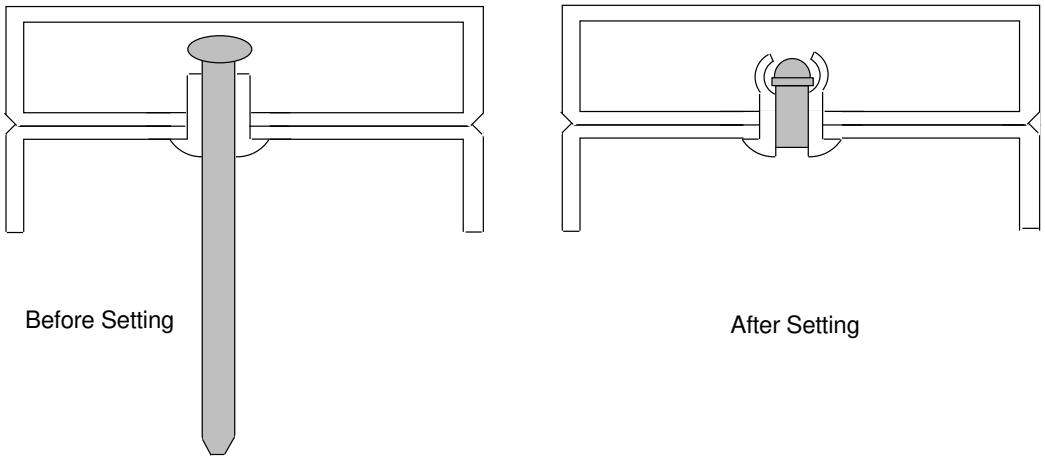
Figure 5: Spacing for Maximum Joint Strength



Blind side clearance is the distance from the underside of the rivet head to the end of the mandrel before setting, minus the combined material thickness. The design must permit the rivet to be fully seated with no interference before setting. See Figure 6.

Various rivet manufacturers have considerably different back side clearance requirements, before setting, for the same rivet diameter. Specific manufacturer qualifications may be required for a design.

Figure 6: Blind Side Clearance



Distances from walls or other members to the rivets' centerlines should be checked against tool sizes to make sure that there is enough clearance to allow for setting. If clearance is not adequate, setting the rivet from the other side may be the best solution.

In Figure 7, insufficient allowances were made for tool nosepiece clearances and depth. These rivets should all be set from the opposite side to provide manufacturing clearances. Refer to Figures 8 and 9 for nosepiece dimensions.

Figure 7: Insufficient Clearances and Allowances

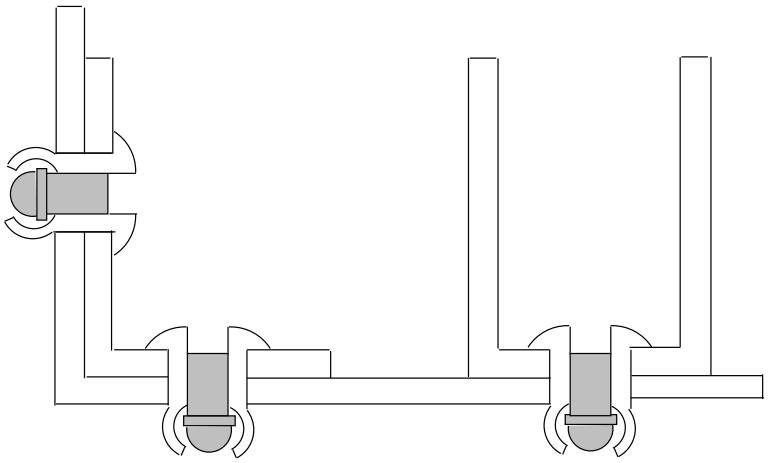
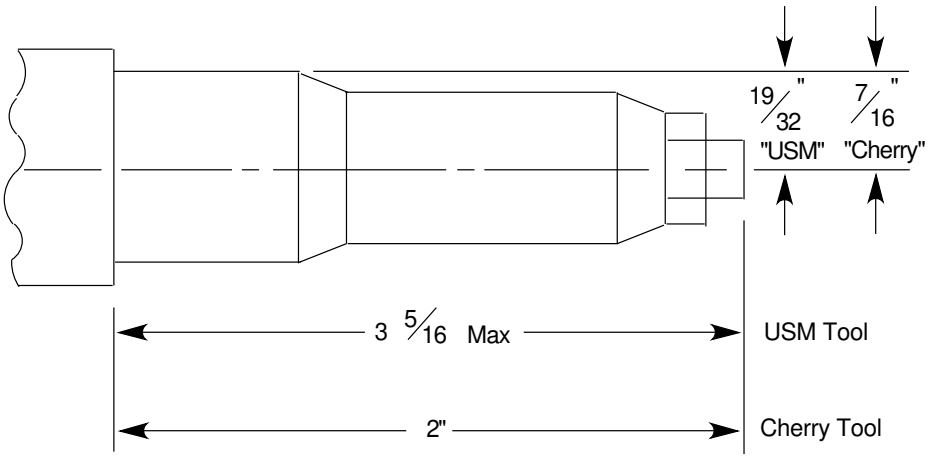
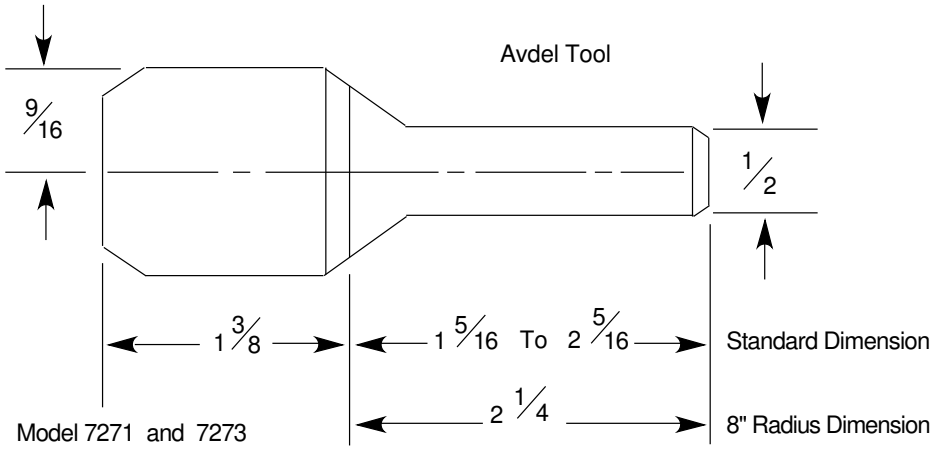


Figure 8: Typical Tool Head Dimensions For Break Stem



Cherry Models GH 702, GH 703, GH 743
USM Models MCS 510, PRG 510, PRG 511

Figure 9: Tool Head Dimensions - Semiautomated Pull-Through Hollow Rivets



9 BASE MATERIALS

9.1 SOFT-TO-HARD RIVETING

Soft-to-hard is sometimes assembled by using a backup washer and forming the bulb against the soft material. A much better practice is to use a large-flange rivet and set the bulb against the hard material. See Figure 10.

9.2 COMPRESSIBLE MATERIAL

The use of additional support is recommended when compressible materials are used. Compressible materials do not provide a firm enough base for clinching action. As shown in Figure 11, a flanged bushing or a plain bushing with a washer should be used. Another alternative would be to use a softer rivet, such as one made of aluminum or plastic, to closely match the riveted material strength.

Figure 10: Fastening Soft-to-Hard

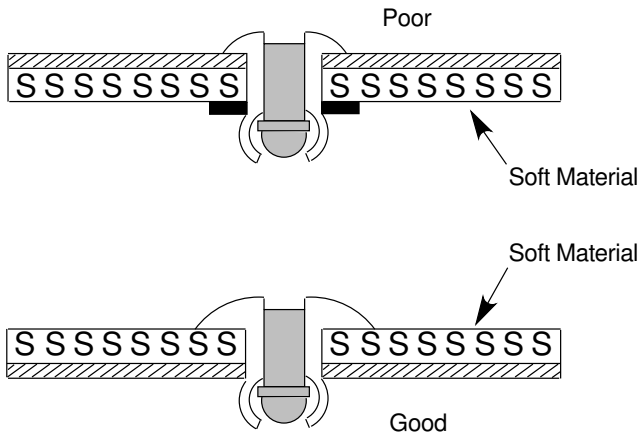
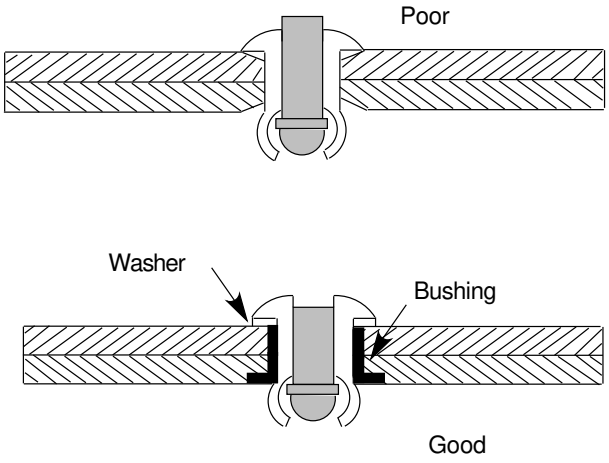


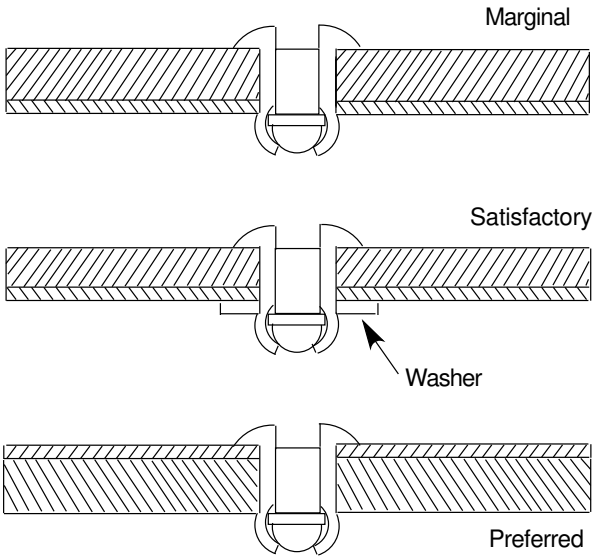
Figure 11: Compressible Material



9.3 THICK AND THIN SHEETS

Whenever possible, set the bulb of the rivet against the thicker material. Where the bulb must be set against the thinner material, the use of a backup washer is preferred. Setting the rivet against this is acceptable, but hole dimensions become critical, and testing of the joint must be done. See Figure 12.

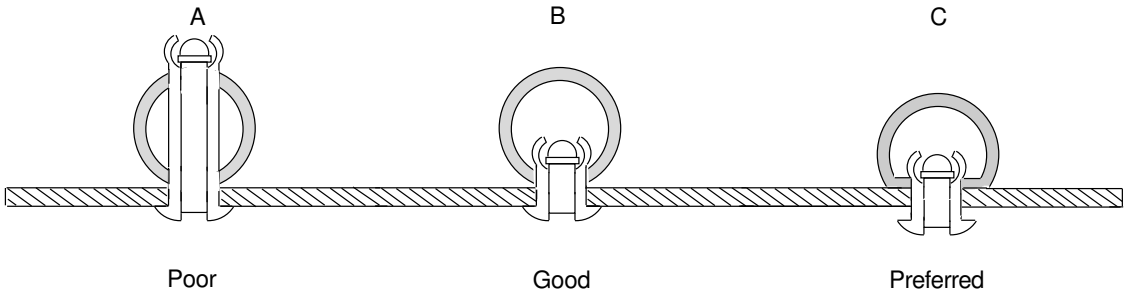
Figure 12: Thick and Thin Sheets



9.4 TUBE-TO-PLATE JOINING

In tube-to-plate joining, it is preferred that riveting be done to a flat side of the tubes, as shown in Figure 13-C. The example of Figure 13-B is acceptable but will result in reduced rigidity. The rivet should not extend through the tubing as in Figure 13-A. This figure also represents riveting extruding sections. It is not recommended that rivets be set against unsupported internal sections.

Figure 13: Tubing to Flat Plates, Extrusions



10 VISUAL INSPECTION OF DOMEHEAD RIVETS

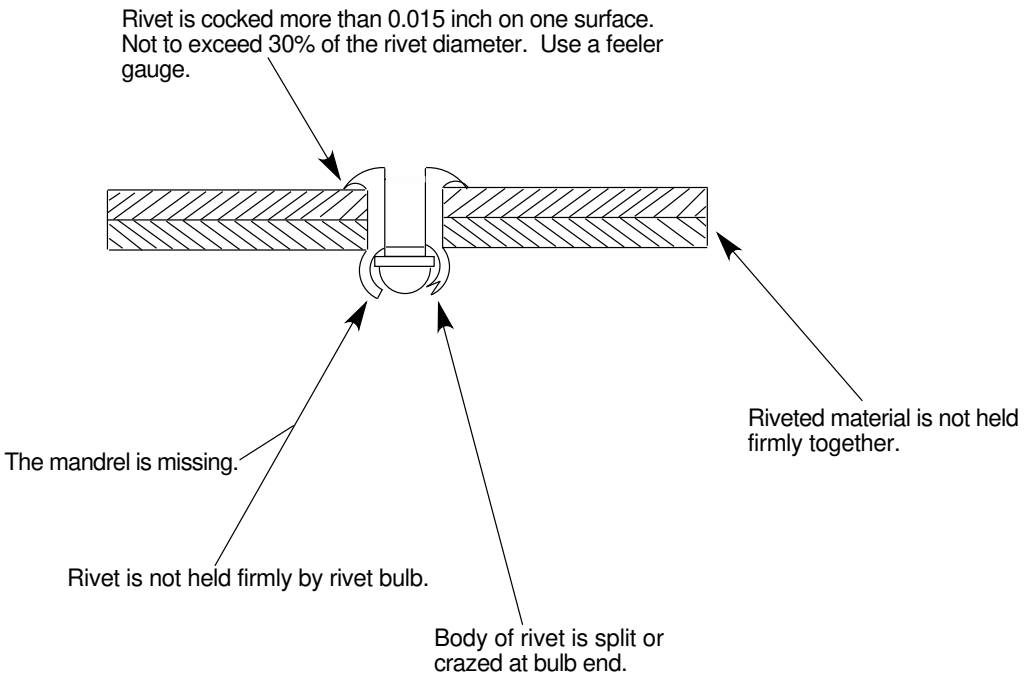
This section defines the inspection criteria for the various types of domehead rivets. These drawings are meant as a guideline for rivet inspection. Refer to the appropriate purchase specifications for rivet dimensioning and detail.

NOTE

Any deviations from this criteria shall be defined in the appropriate engineering drawing.

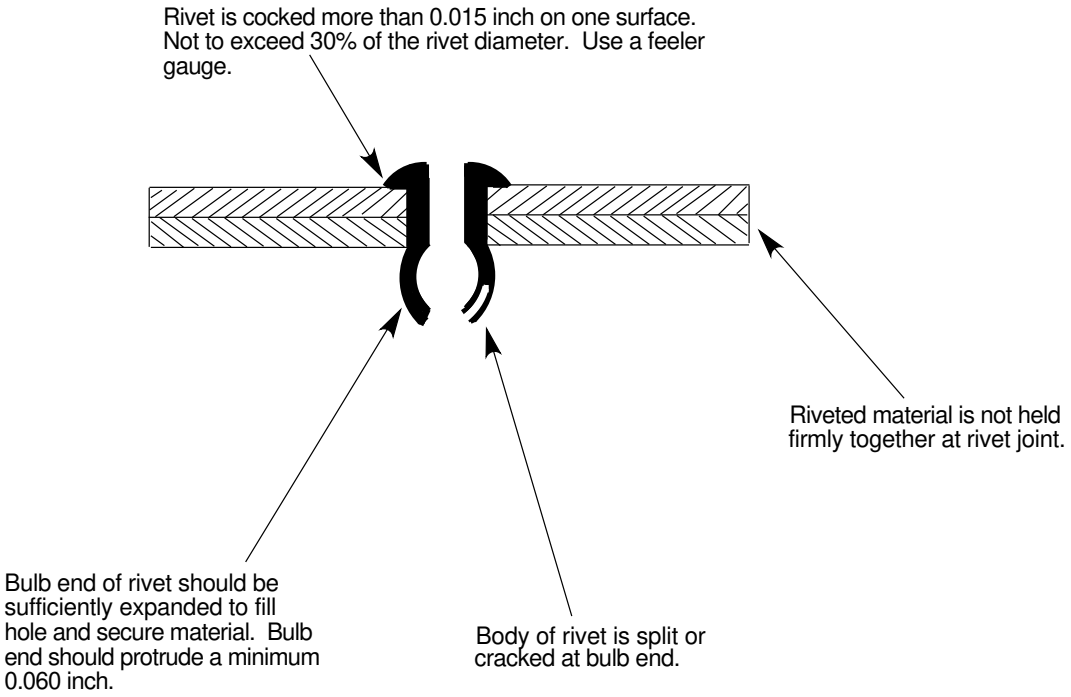
IFI 114 Nonstructural Rivets - Figure 14 shows the possible reasons for rejection of IFI 114 Nonstructural Rivets.

Figure 14: Visual Inspection of Nonstructural Rivets, IFI 114


Rivet is cocked more than 0.015 inch on one surface. Not to exceed 30% of the rivet diameter. Use a feeler gauge.
Riveted material is not held firmly together.
The mandrel is missing.
Rivet is not held firmly by rivet bulb.
Body of rivet is split or crazed at bulb end.

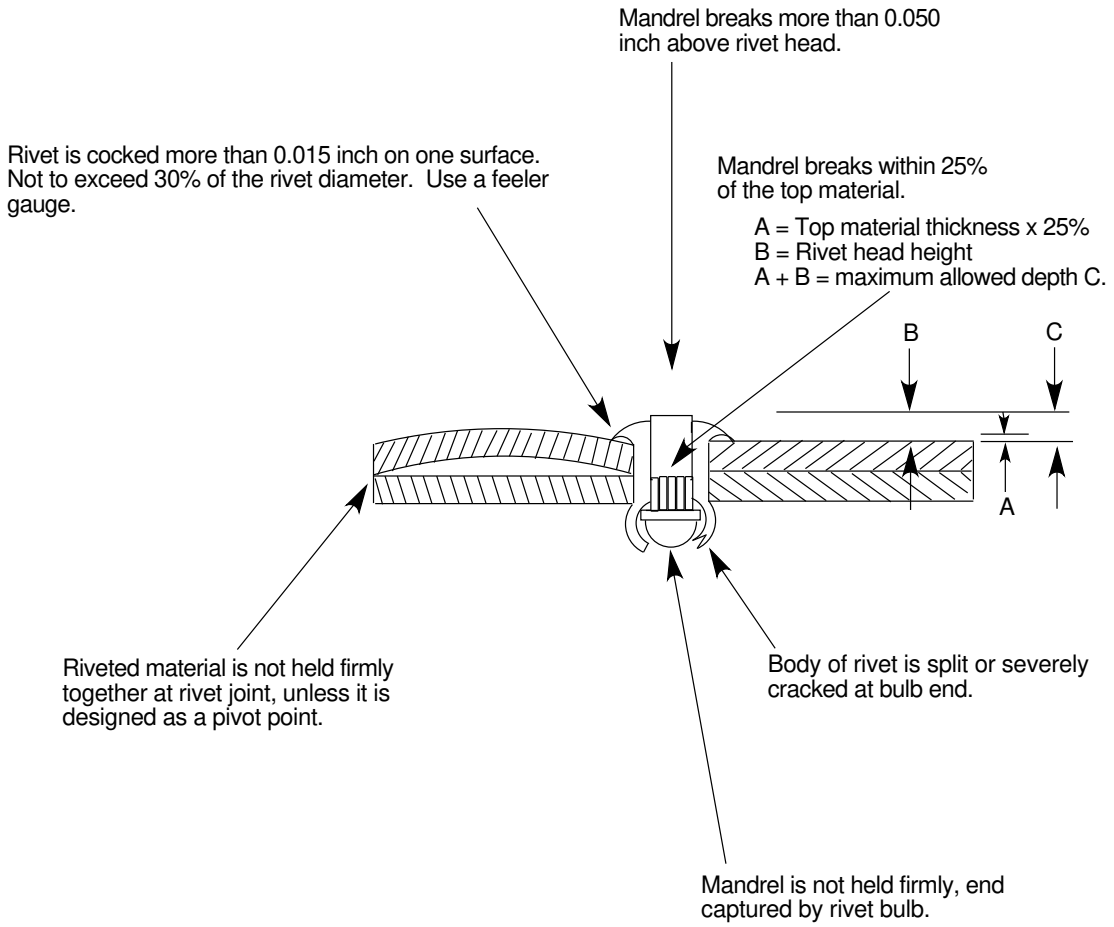
IFI 117 Nonstructural Hollow Type Rivets - Figure 15 shows the possible reasons for rejection of IFI 117 Nonstructural Hollow Type Rivets.

Figure 15: Visual Inspection of Nonstructural Hollow Type Rivets - Semiautomated Pull-Through, IFI 117


Rivet is cocked more than 0.015 inch on one surface. Not to exceed 30% of the rivet diameter. Use a feeler gauge.
Riveted material is not held firmly together at rivet joint.
Bulb end of rivet should be sufficiently expanded to fill hole and secure material. Bulb end should protrude a minimum 0.060 inch.
Body of rivet is split or cracked at bulb end.

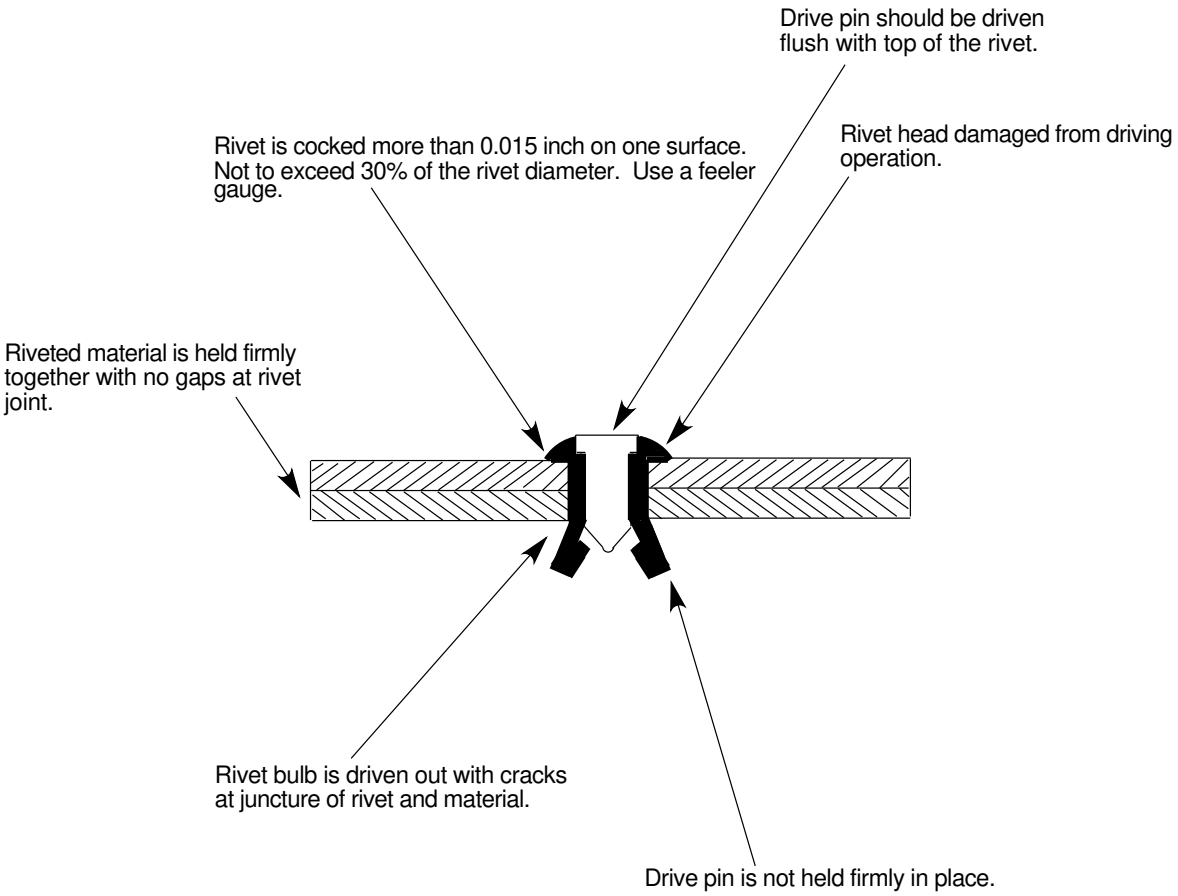
IFI 119 and IFI 126 Structural Rivets - Figure 16 shows the possible reasons for rejection of IFI 119 and IFI 126 Structural Rivets.

Figure 16: Visual Inspection of Structural Rivets, IFI 119 and IFI 126


Mandrel breaks more than 0.050 inch above rivet head.
Rivet is cocked more than 0.015 inch on one surface. Not to exceed 30% of the rivet diameter. Use a feeler gauge.
Mandrel breaks within 25% of the top material.
A = Top material thickness x 25%
B = Rivet head height
A + B = maximum allowed depth C.
B
C
A
Riveted material is not held firmly together at rivet joint, unless it is designed as a pivot point.
Body of rivet is split or severely cracked at bulb end.
Mandrel is not held firmly, end captured by rivet bulb.

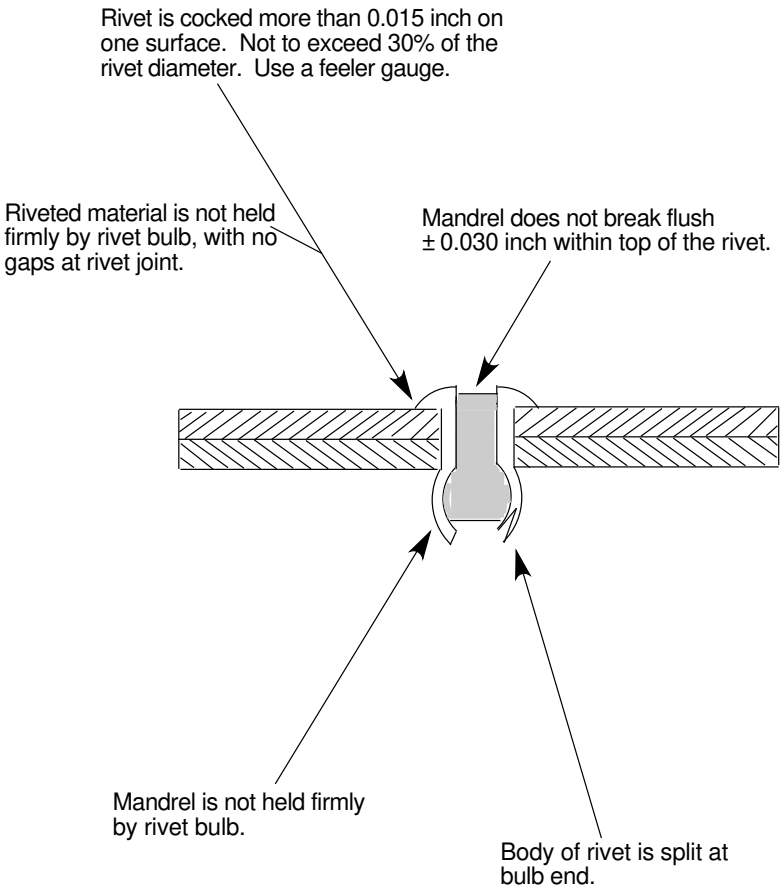
IFI 123 Structural Drive Pin Rivets - Figure 17 shows the possible reasons for rejection of IFI 123 Structural Drive Pin Rivets.

Figure 17: Visual Inspection of Structural Drive Pin Rivets, IFI 123


Drive pin should be driven flush with top of the rivet.
Rivet is cocked more than 0.015 inch on one surface. Not to exceed 30% of the rivet diameter. Use a feeler gauge.
Rivet head damaged from driving operation.
Riveted material is held firmly together with no gaps at rivet joint.
Rivet bulb is driven out with cracks at juncture of rivet and material.
Drive pin is not held firmly in place.

IFI 134 Structural Monobolt Rivets - Figure 18 shows the possible reasons for rejection of IFI 134 Structural Monobolt Rivets.

Figure 18: Visual Inspection of Structural Monobolt Rivets, IFI 134


Rivet is cocked more than 0.015 inch on one surface. Not to exceed 30% of the rivet diameter. Use a feeler gauge.
Riveted material is not held firmly by rivet bulb, with no gaps at rivet joint.
Mandrel does not break flush ± 0.030 inch within top of the rivet.
Mandrel is not held firmly by rivet bulb.
Body of rivet is split at bulb end.

11 VISUAL INSPECTION OF COUNTERSUNK RIVETS

This section defines the inspection criteria for countersunk rivets. These drawings are meant as a guideline for rivet inspection. Refer to the appropriate purchase specifications for rivet dimensioning and detail.

Flush Peened and Countersunk Rivets - These rivets shall not project above the surface and shall be flush to 0.010 inch below the surface. They should completely fill the countersunk area. The bulb end of the flush rivet shall have a minimum upset of 1.5 times the rivet shank diameter. However, a gap of 0.005 inch is allowed if it does not extend to the shank of the rivet and does not exceed 50% of the rivet circumference. In Figure 19, the rivet mandrel is held firmly by rivet body and the bulb has expanded 1.5 times the rivet shank.

The mandrel shall break flush with the material surface, or shall be recessed to a maximum of 50% of the top material thickness. The gap shall extend less than 1/2 times the rivet head diameter. See Figure 20.

Figure 19: Countersunk Rivet Depth

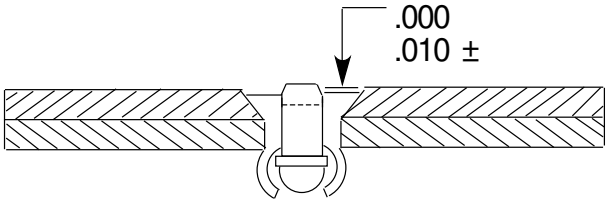
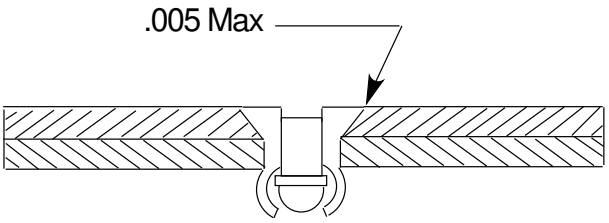
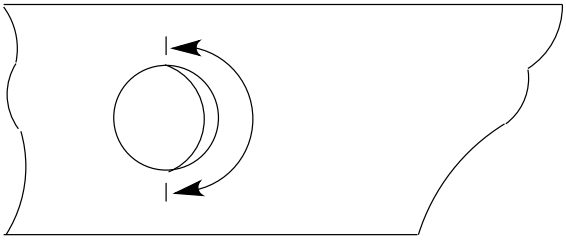


Figure 20: Countersunk Rivet Mandrel Depth



For IFI 119 and 134, the mandrel is to break flush with rivet head, or within 50% of the top material thickness. IFI 117 will be hollow with no mandrel. The mandrel will break within the rivet body and be secured by the rivet bulb for all others.

Figure 21: Countersunk Rivet Allowable Gap



12 RIVET REMOVAL

The following steps are used when removing a rivet. See Figure 22.

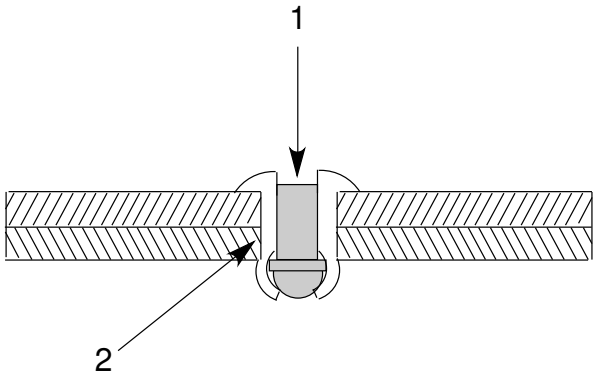
1. Using a drift pin no larger than the mandrel, or a used mandrel, drive the mandrel out toward the bulb end.
2. Drill the rivet body out using a drill the same size as the rivet body, drilling the head side of the rivet. In some cases, pliers will be required to hold the bulb end to prevent the rivet from spinning.

NOTE

Refer to Figure 2 for possible problem areas.

3. Make sure the hole is clear of all rivet material before a new rivet is installed.

Figure 22: Rivet Removal



13 MANUFACTURER TOOLING

Table 11 shows a list of tools and the corresponding rivet grades, which have been evaluated and and approved for manufacturer use.

Table 11: Recommended Tools

Rivet Size (inch)	IFI Standard	Manufacturer's Tool Number					
		Avdel		Cherry		USM	
		Tool Number	Weight (pounds)	Tool Number	Weight (pounds)	Tool Number	Weight (pounds)
3/32	114			GH702	3.5	MCS 510 PRG 510	4.3 4.0
1/8	114 – 119	734	3.3			PRG 511	4.0
	117	7271 7273	5.22				
5/32	114 –	734	3.3	GH702	3.5	MCS 510 PRG 510 PRG 510	4.3 4.0 4.0
	114 – 119			GH703	5.0		
	117	7271 7273	5.2				
3/16	114 – 119 – 134			GH703 GH743	5.0 6.25		
	117	7271 7273	5.2				
1/4	114 – 119 – 134			GH743	6.25		
	117	7271 7273	5.2				

Each tool in this chart requires special nosepieces that depend on the type and size of the rivet. Refer to the manufacturer's catalog for further information.

All tools are hand-held with the exception of 7273, which is designed to be bench-mounted with foot pedal operation.

APPENDIX A REFERENCED DOCUMENTS

A.1 Other Documents

Document Number	Document Title
IFI - 110	*Glossary of Terms Relating to Blind Rivets*
IFI - 114	*Standard for Break Mandrel Rivets*
IFI - 117	*Standard for Pull Through Mandrel*
IFI - 119	*Standard for Structural Flush Break Pull Mandrel Self Plugging Blind Rivets, Type 2A*
IFI - 123	*Standard for Drive Pin Mandrel*
IFI - 126	*Standard for Break Mandrel Closed End Blind Rivets*
IFI - 130	*Structural Splitting Self Plug Pull Mandrel*
IFI - 134	*Multi-Grip Flush Break Pull Mandrel Self Plugging Blind Rivet*

A.2 Ordering Information

Following are the sources for documents not available from Standards and Methods Control.

- Industrial Fasteners Institute
  1505 East Ohio Bldg.
  1717 East 9th Street
  Cleveland, Ohio 44114

APPENDIX B RELATED DOCUMENTS

B.1 Other Documents

Document Number	Document Title
A-PS-1219042-00	*Rivet Paint Breaking Conductive*
A-PS-9000030-GS	*General Rivet Specification*
A-PS-9000052-GS	*Rivet Repetition Clinch Barrel*
A-PS-9000053-GS	*Rivet Repetition Taper Barrel*
A-PS-9009595-00	*Rivet Blind Self Plugging*

B.2 Ordering Information

Following are the sources for documents not available from Standards and Methods Control.

These documents are available from Central Specification Control System, NRO-5/M2, any Microfilm Reference File (35 mm aperture card "TUB") or the SPOC system.

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